

Amendments to the Drawings:

The drawing sheets attached in connection with the above-identified application containing Figures 1-8 are being presented as new formal drawing sheets to be substituted for the previously submitted drawing sheets. Figures 1-4 are now labeled as “Prior Art.” Formal versions of all of the Figures are now provided. As the only changes to the drawings are to label Figures 1-4 as “Prior Art” and to provide formal versions, no annotated drawings sheets are provided. Instead, only replacement drawings sheets are provided.

REMARKS

Applicant respectfully requests reconsideration of the present application in view of the foregoing amendments and in view of the remarks that follow.

I. Claim Status

Claims 1, 8, 10 and 12 are currently amended and claims 11 and 15 are cancelled, without prejudice or disclaimer. No claims are added. Support for these revisions are evident throughout the specification. Thus, support for the amendments to claim 1 can be found on page 6, line 30 – page 7, line 27 and support for the amendments to claim 12 can be found on page 7, line 29 – page 8, line 22, of the application as filed. Claims 8 and 10 are amended to correct informalities. No impermissible new matter is added, therefore.

Upon entry of the amendment, claims 1, 6, 8, 10 and 12-14 will be pending and subject to examination on the merits.

II. The Drawing Objections Should Be Withdrawn

The drawings are objected to under 37 C.F.R. § 1.83(a) for not showing all features of the claims. Claims 11 and 15 have been cancelled. Thus, the drawing objection regarding claims 11 and 15 is moot. Support for “fin...arranged between flat tubes of the heat exchanger or perpendicular to the flat tubes of the heat exchanger” can at least be found in Figure 1 as evidenced by at least page 5, lines 4-9 of the application as filed. Thus, the drawing objection regarding claim 1 is moot.

Figures 1-4 are objected to for not containing a legend that designates these figures as “Prior Art.” Figures 1-4 are amended as appropriate.

The Office requires new corrected drawings in compliance with 37 C.F.R. § 1.121(d). Formal drawings are provided herewith.

Favorable consideration and withdrawal of the drawing objections is respectfully requested.

III. The Specification Objections Should Be Withdrawn

The specification is objected to for not including section headings and for referring to claim 1 on page 1 and claims 1 and 11 on page 2.

The specification is amended as appropriate.

No section (1) Field of the Invention or (2) Description of Related Art Including information disclosed under 37 C.F.R. §§ 1.97 and 1.98, however, is added as a close reading of 37 C.F.R. § 1.77(b) does not require such section titles under the Background of the Invention Section. Additionally, no claim or claims section is added as such a section already exists.

The abstract is amended to further conform to typical U.S. practice and to include the title "ABSTRACT OF DISCLOSURE" as requested by the Office.

Favorable consideration and withdrawal of the specification objections is respectfully requested.

IV. The Claim Objection Should Be Withdrawn

Claim 10 is objected to under 37 C.F.R. § 1.75(c) as being of improper dependent form for failing to further limit the subject matter of the previous claim. The Office specifically contends that claim 10 does not limit claim 1 (Office Action at p. 4). Claim 10 does not depend from claim 1. Claim 10 depends from claim 12 and limits claim 12. Favorable consideration and withdrawal of the claim objection is respectfully requested.

V. The 35 U.S.C. § 112 Claim Rejections Should Be Withdrawn

Claim 10 is rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement. Support for claim 10, however, can at least be found on page 8, lines 6-17 of the application as filed.

Claims 1, 6, 8 and 10-15 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite. The claims have been amended as appropriate.

Favorable consideration and withdrawal of the 35 U.S.C. § 112 rejections is respectfully requested.

VI. The 35 U.S.C. § 103(a) Claim Rejections Should Be Withdrawn

Claims 1, 6, 8 and 10-15 are rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 4,365,667 (“Hatada”) in view of U.S. Patent No. 4,958,681 (“Kadle”). Claims 11 and 15 are cancelled, without prejudice or disclaimer. Hatada in view of Kadle fails to disclose, teach or suggest the claimed invention.

For example, Hatada in view of Kadle fails to disclose, teach or suggest a fin that comprises, among other things “wherein the S-shaped cross section includes an incident-flow region, a flow-off region, and a deflecting region arranged between the incident-flow region and the flow-off region, wherein the incident-flow region includes an incident flow-angle that forms an angle with a central plane, the flow-off region includes a flow-off angle that forms an angle with the central plane, and the deflecting region includes a deflecting angle that forms an angle with the central plane, and wherein the incident flow- angle and the flow-off angle each lies in a range of from 0 to 10 degrees and the deflecting angle lies in a range of from 15 degrees to 35 degrees” as recited in claim 1. Additionally, Hatada in view of Kadle fails to disclose, teach or suggest a fin that comprises, among other things, “wherein the cross section includes an incident-flow region, a flow-off region, and a deflecting region arranged between the incident-flow region and the flow-off region, wherein the incident-flow region includes an incident flow-angle that forms an angle with a reference plane, the flow-off region includes a flow-off angle that forms an angle with the reference plane, and the deflecting region includes a deflecting angle that forms an angle with the reference plane, and wherein the incident flow- angle and the flow-off angle each lies in a range of from 0 to 25 degrees and the deflecting angle lies in a range of from 15 degrees to 35 degrees” as recited in claim 12.

Hatada is directed “to heat exchangers utilizing air flow suitable for use with air conditioners, refrigerating apparatus, dehumidifiers and the like” (Hatada at col. 1, lines 5-11). Hatada discloses stepped louvers 45 (Hatada at col. 8, lines 28-29).

The Office contends that the louvers 45 of Hatada are analogous to the gills of the claimed invention (Office Action at p. 7). The Office further contends, relying on Figure 9 of Hatada, that Hatada discloses that the alleged gills (louvers 45) have a “S-shaped cross section with an incident-flow angle approximately the same size as a flow-off angle of zero degrees and a deflecting angle of about 22 degrees (as permissibly gleaned from the drawings below) (Office Action at 7-8).

Figure 9 “is a sectional view, on an enlarged scale, of the stepped louvers” (Hatada at col. 4, lines 38-40). Figure 9 of Hatada is not drawn to scale. As such, any angle amounts obtained from marking-up Figure 9 are not an indicator of the angles shown in Figure 9. Moreover, none of the drawings in Hatada are drawn to scale (Hatada at col. 4, lines 15-50). Thus, it cannot be permissibly gleaned from any of the drawings in Hatada what any angle shown in a drawing is. The written text of Hatada fails to cure the deficiencies of Hatada’s figures because the text does not teach or suggest the angle amount of any angle. Accordingly, the rejection of claims 1 and 12 is improper.

As an alternate theory, the Office contends that “it would have been obvious to one having ordinary skill in the art at the time the invention was made to employ any deflection and/or flow angle, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art” (Office Action at p. 8). Additionally, the Office contends that “[a]s recognized by the prior art, the angle affects the flow characteristics, which directly relate to pressure drop and heat transfer” where the Office relies on Hatada to teach that “deflecting angles are employed to remove/reduce the boundary layer to affect heat transfer” (Office Action at p. 9).

Hatada discloses (1) “prevent[ing] formation of boundary layers to increase the heat transfer coefficient of the surface of each fin plate through which heat transfer occurs between the two heat transfer elements” (Hatada at col. 2, lines 1-5). Hatada teaches that (1) is accomplished by the “absence of the edge of the next following stepped louver at the same level as the rear edge of each stepped louver of each layer puts an end to the growth of the temperature boundary layer formed on the surface of each stepped louver” (Hatada at col. 6, lines 34-56). Thus, Hatada discloses not having an edge of one stepped louver at the same

level as the rear edge of the next stepped louver effects heat transfer, but does not teach or suggest that optimizing an angle effects heat transfer.

Moreover, Hatada discloses that (2) “[i]t is also earnestly desired that the fin plates be increased in strength” (Hatada at col. 2, lines 62-63). Hatada teaches that (2) is accomplished by forming the stepped louvers with “two ridges 25a and 25b at the bends, so that the flexural rigidity of each fin plate 21 longitudinally of the rows of heat transfer tubes 22 is greatly increased” (Hatada at col. 7, lines 6-68). Thus, Hatada discloses having ridges to effect strength, but does not teach or suggest that optimizing an angle will effect strength.

Thus, Hatada does not disclose, teach or suggest that flow angles and deflecting angles are result-effective variables that would have been obvious to optimize.

Kadle fails to cure the deficiencies of Hatada. Kadle discloses “it is an object of the invention to provide a heat exchanger having louvered fins with a bypass channel around the tubes of the optimum width to minimize air side pressure drop” (Kadle at col. 2, lines 4-8). Kadle discloses that bypass channel 52 “allows a relatively unimpeded flow passage” and that this bypass channel minimizes air side pressure drop (Kadle at col. 2, lines 4-8 and col. 4, lines 4-8). Thus, Kadle discloses having a bypass channel to effect pressure drop but does not teach or suggest that optimizing angles will effect the pressure drop.

Thus, Hatada in view of Kadle fail to disclose, teach or suggest flow angles and deflecting angles are result-effective variables that would have been obvious to optimize.

Accordingly, the rejection of independent claims 1 and 12 is improper. Claims 6, 8, 10 and 13-14 depend from claim 1 or claim 12 and are allowable therewith for at least the reasons that claims 1 and 12 are allowable in addition to their respective recitations. Favorable consideration and withdrawal of the 35 U.S.C. § 103(a) rejection is respectfully requested.

CONCLUSION

Applicant believes that the present application is now in condition for allowance. Favorable reconsideration of the application as amended is respectfully requested.

The Examiner is invited to contact the undersigned by telephone if it is felt that a telephone interview would advance the prosecution of the present application.

The Commissioner is hereby authorized to charge any additional fees which may be required regarding this application under 37 C.F.R. §§ 1.16-1.17, or credit any overpayment, to Deposit Account No. 19-0741. Should no proper payment be enclosed herewith, as by the credit card payment instructions in EFS-Web being incorrect or absent, resulting in a rejected or incorrect credit card transaction, the Commissioner is authorized to charge the unpaid amount to Deposit Account No. 19-0741. If any extensions of time are needed for timely acceptance of papers submitted herewith, Applicant hereby petitions for such extension under 37 C.F.R. §1.136 and authorizes payment of any such extensions fees to Deposit Account No. 19-0741.

Respectfully submitted,

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MARKED-UP VERSION OF ABSTRACT

~~(57) Abstract: The invention relates to a~~

ABSTRACT OF THE DISCLOSURE

A heat exchanger and a rib ~~[(1)]~~, such as in particular a corrugated rib ~~(1)~~, especially for a flat tube heat exchanger, ~~in particular~~ such as a coolant or charge-air cooler for motor vehicles. The corrugated rib ~~[(1)]~~ is arranged between flat tubes ~~[(3)]~~ of the heat exchanger, is connected thereto in a material fit, comprises gills ~~(6,8)~~, can be exposed to a flow of air and comprises ~~moulded~~ molded reinforcement means.